



Hardy Fern Foundation Quarterly



Spring 2016

THE HARDY FERN FOUNDATION

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The Hardy Fern Foundation was founded in 1989 to establish a comprehensive collection of the world's hardy ferns for display, testing, evaluation, public education and introduction to the gardening and horticultural community. Many rare and unusual species, hybrids and varieties are being propagated from spores and tested in selected environments for their different degrees of hardiness and ornamental garden value.

The primary fern display and test garden is located at, and in conjunction with, The Rhododendron Species Botanical Garden at the Weyerhaeuser Corporate Headquarters, in Federal Way, Washington.

Affiliate fern gardens are at the Bainbridge Island Library, Bainbridge Island, Washington; Bellevue Botanical Garden, Bellevue, Washington; Birmingham Botanical Gardens, Birmingham, Alabama; Coastal Maine Botanical Garden, Boothbay, Maine; Dallas Arboretum, Dallas, Texas; Denver Botanic Gardens, Denver, Colorado; Georgia Perimeter College Garden, Decatur, Georgia; Inniswood Metro Gardens, Columbus, Ohio; Lakewold, Tacoma, Washington; Lotusland, Santa Barbara, California; Rotary Gardens, Janesville, Wisconsin; Strybing Arboretum, San Francisco, California; University of California Berkeley Botanical Garden, Berkeley, California; and Whitehall Historic Home and Garden, Louisville, Kentucky.

Hardy Fern Foundation members participate in a spore exchange, receive a quarterly newsletter and have first access to ferns as they are ready for distribution.

Cover design by Willanna Bradner

HARDY FERN FOUNDATION QUARTERLY

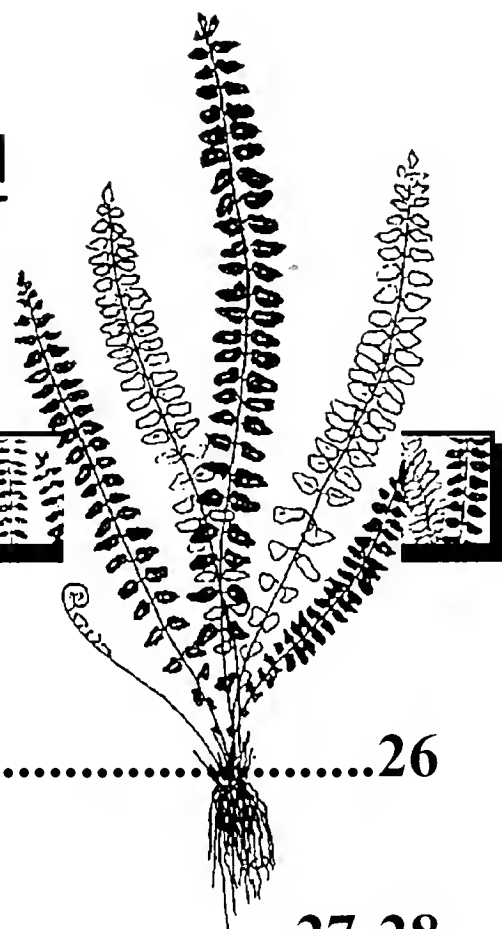
THE HARDY FERN FOUNDATION QUARTERLY

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Mark your calendars -

**2016 Fern Fest
June 3rd & 4th!**

President's Message

Welcome to the spring issue of the HFF Quarterly. The mild winter in the Northwest was a blessing to the garden and many ferns started unfurling their fronds earlier than normal with little damage from late frosts. When I think of spring one of my favorite companion plants for ferns comes to mind - epimediums. Bill Roeder, of Bouquet Banque Nursery in Marysville, Washington grows many exceptional species and varieties. Over the last few decades the popularity and availability of these useful perennials has exploded. We are fortunate to have Bill share his experience and enthusiasm for these plants in this issue.

I was also excited to see our HFF Board Member, Pat Riehl, had her spectacular stumpy garden featured in the February issue of *Gardens Illustrated Magazine*. Congratulations to Pat and Walt Riehl for such special recognition of an exceptional garden!

If you are looking for more beautiful gardens with great fern displays, you may enjoy reading about two of our affiliate gardens, Coastal Maine Botanical Garden and the Rotary Gardens located in Janesville, Wisconsin. Both gardens have been widely praised for their beauty and community programs. We are pleased to have them as long time participants in our ongoing fern evaluations.

Make sure to mark your calendars for upcoming HFF events. In May we are excited to host Cuban botanist Carlos Sanchez, a senior researcher for the University of Havana and an expert on the ferns of Cuba to share his knowledge at a special class at the Elisabeth C. Miller Botanical Garden in Seattle. This is a rare opportunity to get a firsthand glimpse of the amazing flora as our ties to this nation are being renewed.

The 43rd Annual HFF Fern Festival will be held June 3rd & 4th at the Center for Urban Horticulture at the University of Washington. You are cordially invited to our annual member's meeting Friday night. We are excited to have Ed Alverson as our guest speaker. Mr. Alverson is a talented botanist and well versed on the West Coast native ferns, the topic he will be sharing with us that evening. Make sure to come early and find a few choice ferns at the best fern sale in the country!

On a closing note I wish to congratulate and applaud a sister organization for 125 years of fern enthusiasm. The British Pteridological Society is celebrating its 125th anniversary this summer. I thank them for their support over the years of the HFF and for welcoming many HFF members on their fabulous fern forays. I look forward to joining our friends in the UK this summer to help them celebrate this milestone.

All the best,

Richie

HFF President

Athyrium alpestre

Alpine Lady Fern

James R. Horrocks

Salt Lake City, UT

This interesting alpine species has been considered under several other generic names such as *Phegopteris*, *Pseudoathyrium*, and even *Polypodium* because of its lack of indusia covering the sori, hence its once common name Alpine Polypody. The species name *alpestre* means “from the Alps” or simply “from alpine environments”. Generally speaking, there seem to be two forms. Subspecies *distentifolium* is the Old World form native to the highlands of Scotland, up to Iceland and across Europe and Siberia to Kamchatka and the northern Japanese islands of Hokkaido and Honshu. Being a circumboreal fern, it is not found in the Himalaya. In North America it is considered subspecies *americanum* and seems quite distinct from *distentifolium*. Its North American range is mostly in the west from the Sierra Nevada of California across to Utah and Colorado and northward into British Columbia and Alaska. It is strangely somewhat disjunct in eastern Canada. Like *Polystichum lonchitis*, *A. alpestre* et al is a remnant of post-glacial times and both species are distributed across the same northern range in North America, Europe, and Asia. Both are generally difficult in cultivation, especially those in the New World.



A. alpestre is scattered but common at high altitudes and can be locally abundant. It frequents moist ravines, high meadows, and mountain slopes among boulders and talus where the snow-pack remains to gradually provide the moisture it needs. It prefers moist acidic soils rich in leaf-mold and a cool alpine setting, not growing at lower altitudes where temperatures may rise appreciably. Growing sites may be areas of accumulation of winter snow which covers them and insulates from severe cold. Spent fronds have a slow rate of decay, building up dense acidic humus around the clumps. They may even form a heat absorbing cover to aid with temperature balance, especially in early spring sunshine. In the lower part of its altitude range there is a small overlap with *A. filix-femina* which it superficially resembles. The lack of indusia in *A. alpestre* and the smaller sori easily separate it from *A. filix-femina*. The American counterpart has prominent rachises and midribs giving it a skeletal appearance while deeply incised pinnules with wide spaces or sinuses between them add to its spindly appearance. The author has noted that it is usually quite easy to tell apart from *A. filix-femina*.

Variation in *A. alpestre* is mainly limited to size and color which could simply be the effects of environment but it is far less variable than *A. filix-femina*. Very similar to *A. alpestre* is *A. flexile* which some authorities believe is merely a subspecies or variety of the former. *A. flexile* is, however, much smaller with smaller pinnae and fewer pinnules. The fronds often lay close to the ground while in *A. alpestre* they are held erect. The fertile fronds of *A. flexile* have sori from the base upward while in *A. alpestre* they are found from the apex downward, often covering almost the entire frond. *A. flexile* is also very rare. *A. alpestre* subsp. *distentifolium* from Europe and Asia is generally shorter and more compact than the North American variety.

Description: The rhizomes are short-creeping to erect and ascending, seldom branching, the living crowns embedded in the decayed stocks of old crowns, producing fronds in a vase-like array that are held erect and measuring 16 to 32 inches in length. The rhizomes

often hold onto old stipe bases and are clothed with light brown to sometimes dark brown lanceolate scales. The stipes are thicker than in *A. filix-femina* and are 1/4 to 1/3 the length of the fronds, being flattened and almost black at the base with sparse limp pale-brown to dark brown scales. Above, the stipe is reddish brown to yellow or straw-colored with a groove or furrow down the middle. The lacy deciduous fronds are ovate- triangular to oblong-lanceolate and are bipinnate-pinnatifid to tripinnate-pinnatifid and widest about the middle. The pinnae are distant below but crowded above and strongly oblique. They are triangular to lanceolate in outline and obtuse at the base but acute at the apex.

The pinnae are generally more tilted or ascending toward the apex of the frond than in *A. filix-femina*. As has been mentioned, the pinnules are deeply incised with wide sinuses. The sori are small and circular, not J-shaped, and closer to the margins. They are found mainly on the upper half of the frond but may cover nearly the entire frond in some specimens. There are no indusia, although some specimens may show minute or rudimentary indusia that quickly disappear. This lack of indusia is unique to this species in the genus *Athyrium*. Sori are found at the end of a vein that terminates in a reflexed tooth that presumably affords some protection to the sori. The spores have a reticulate ridged surface under a light microscope, differing from the granular spores of *A. filix-femina* that lack any ridges. *A. alpestre* is a sexual diploid.

Culture: Kaye and Rickard maintain that the Alpine Lady fern is easy to cultivate while Olsen and Mickel say it is moderate to difficult. This disparity of opinion is cleared up when we consider that we are comparing subsp. *distentifolium* with subsp. *americanum*. Plants from Europe are evidently easier to grow than those found in North America which tend to fade away after a few years in cultivation. In Utah, they can be seen occasionally in a garden, no doubt kidnapped from the high mountains, but the author can attest from experience that they do indeed gradually fade away. Even spore-grown plants behave the same way. My attempts were from both a transplant from a friend and spore-grown stock. Being that we are dealing with an alpine plant, it should be painfully obvious that the heat in lower altitude gardens shortens their life. Also, an acidic soil, high in humus content, is more to their benefit and this is sometimes hard to maintain, especially in lowland gardens of the intermountain west. The soil must be constantly moist but with good drainage. Poorly draining soils such as clays will not do. This species is quite dramatic and attractive in the garden and is not entirely impossible to grow but extra effort will be required for its success. Nestled up against boulders may help, giving it a cool root run. This is often the problem with alpiners. The soil heats up too much and this may be a factor in their demise. If you are fortunate enough to already have this species in your collection, you must be doing something right or you must be located in an alpine area living the “high life”.

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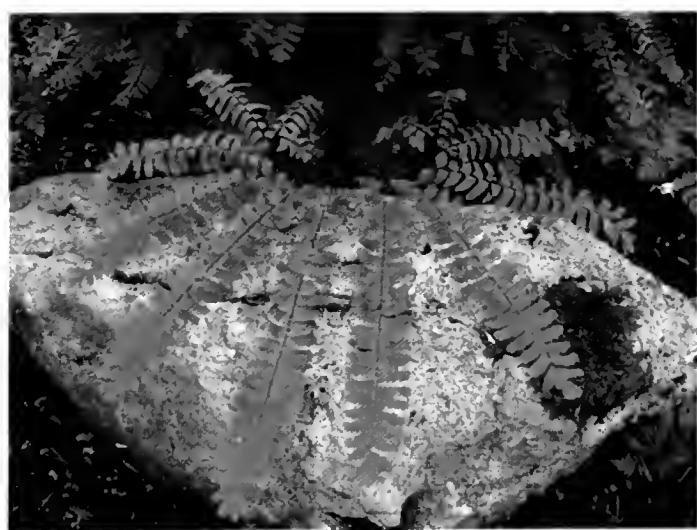
Coastal Maine Fern Garden Report

Boothbay, Maine

Sharmon Provan ~ Plant Records Coordinator/Managing Horticulturist

This little garden hidden along a stream in our woods was the first garden created, originally by volunteers, in our botanical gardens. (See photo page 36) Our first plant, an *Athyrium niponicum* 'Pictum' was tucked in amongst native *Osmundastrum cinnamomeum*, *Dennstaedtia punctilobula*, woodland trees and many *Cypripedium acaule*. With years-worth of selections from the Hardy Fern Foundation, donations from a member, and several sourced additions, this garden, while remaining small, continues to be a wonderful respite and a place to for reflection while listening to the birds, squirrels, and the occasional hum of a small boat carried down the saltwater river. While encroaching tree canopy and the aggressiveness of the hayscented ferns have decreased the local lady's slippers population, the ferns continued to thrive, for the most part, in this area. Even some from far-away locales such as the Mexican male fern are doing well. My biggest challenge in this garden over the past few years is that we are in a holding pattern, ready to move as we expand our gardens in line with our new 20-year Master Plan, but are not quite there yet. I am anxious to increase the varieties and quantities of ferns, but unable to in its current location. Besides annual late fall visits from a hungry and destructive skunk with very long claws, the weather over the past several years has had the strongest impact. The fern garden is somewhat protected in its location, but has had some treefall damage in recent years. We have also had some severe weather conditions in those years with colder than normal temperatures and higher than normal (more than 3 feet) snowfall amounts. This last factor was detrimental in many areas of our gardens due to the length of time it took for the snow to finally melt--it was difficult for both plants and staff to get the season started. I think that some of the plants were not yet big enough or strong enough to protect themselves from the refreezing temperatures in the spring after the initial thaw. The advancing season will be telling as well. We have had very little snow coverage this year and a lot of freeze/thaw temperature changes. I look forward, Sue, to filling in you and the HFF in on what happens this spring and in years to come when we expand to another location in our gardens. Thank you for all you do.

Photos courtesy of Sharmon Provan



Adiantum pedatum



Adiantum aleuticum

NAME	PLANT DATE	PLANT # HISTORY/ CURRENT # IN BOLD	AVERAGE FROND LENGTH
Adiantum aleuticum	2000	mass ;5;6;3;5;3	31"
Adiantum aleuticum	2000	6 ;5;3	25"
Adiantum aleuticum 'Subpumilum'	2004	4 ;3	6"
Adiantum aleuticum 'Subpumilum'	2005	2 ;3;2;3	6"
Adiantum pedatum	2003	mass ;4;3;1	29"
Adiantum venustum	2004	mass ;6;5;4;3	14"
Asplenium scolopendrium 'Angustifolia'	2013	2 ;3;3	9"
Asplenium trichomanes	2009	10	
Athyrium angustum 'Branford Beauty'	2001	mass ;3;4;3	24"
Athyrium 'Branford Rambler'	2007	1 ;1	21"
Athyrium filix-femina 'Frizelliae'	2000	1 ;2;3	5"
Athyrium filix-femina 'Minutissimum'	2010	2 ;3;3;72	8"
Athyrium filix-femina 'Victoriae'	2007	3 ;2;2;2;2;2;2;2	17"
Athyrium niponicum 'Applecourt'	2007	2 ;2;2;2;2;1;1;1;1	14"
Athyrium niponicum 'Pictum'	2000	mass ;3	15"
Athyrium niponicum 'Silver Falls'	2007	1 ;1	5.5"
Athyrium niponicum var. pictum 'Wildwood Twist'	2007	2 ;1;1	28"
Blechnum australe	2015	2 ;2	

ORNAMENTAL RATING	EASE OF CULTIVATION	2015 NOTES	CONDITION
5	5	Spores	E
5	5	Spores	E
3	5	Spores; browning due to early spring freeze	G
3	5	Spreading clumps; some browning from early spring freeze	G
5	5	Spores	E
5	5	Spores; beautiful	E
5	5	Few spores	E
		Located in different garden, I will have to get this info in 2016	A
5	5	Spores	E
4	5	Spores; some bug damage	E
1	3	Still struggling	P
3	4	1 plt very small; bug damage?	A
5	5	Spores	E
3	5	1 plt has spores; hard winter	F
5	5	Still lovely	E
5	5	Slowly spreading	E
4	5	Spreading; a bit heat stressed	G
		Currently in Greenhouse; will plant in Spring 2016	A

Blechnum penna-marina	2006	mass;5;3	3"
Blechnum penna-marina	2013	8;3;3	5"
Cryptogramma crispa	2013	3;3	4.5"
Dryopteris affinis 'Revolvens'	2007	5;3;3	26"
Dryopteris affinis 'Stableri Crisped'	2006	6;5;6;3	24"
Dryopteris affinis 'The King'	2010	3;3;72	21"
Dryopteris bissetiana	2004	5;4;3	24"
Dryopteris clintoniana	2000	8;5;2	42"
Dryopteris clintoniana	2002	4;3;2;3	29"
Dryopteris crassirhizoma	2000	5;4;5;3	46"
Dryopteris cristata	2000	7;4;5;4;2;3	17.5"
Dryopteris expansa	2007	3;1;1;1;1;1	20.5"
Dryopteris filix-mas 'Crispatissima'	2001	3	21.5"
Dryopteris filix-mas 'Linearis Polydactyla'	2007	5;3;3;3;3;3;3;2	17"
Dryopteris filix-mas 'Parsley'	2007	1;1	16"
Dryopteris filix-mas 'Parsley'	2014	3	
Dryopteris intermedia	2000	8;3	19"
Dryopteris marginalis	2004	1	24"
Dryopteris namegatae	2010	3;3	6"
Dryopteris polylepis	2000	3	19"

3	2	Moss taking over; spreading loosely; major animal (skunk?) rooting in 2014	F
5	5	Spreading	E
4	5	Spores	G
4	5	Spores; may be spreading	F
5	5	2 plts with spores; pt of 1 plt reverted fronds	E
4	5	Spores; heat stressed, spotting	F
5	5	Spores; spreading	E
4	5	Spreading clumps	G
4	5	Spores	G
5	5	Spores	E
3	4	Spores; 1 clump spreading	F
3	5	Spores; 2 plants were smaller from 2013	F
5	5	Spores	E
4	4	Spores; dry white spots-heat	F
3	5	Spores	F
5	5	Located in different garden, I will have to get measurement info in 2016	E
5	5	Spores; clumping	E
4	5	Spores	G
1	4	Spores; plts--1 lg, 1 sm, 1 very sm; beautiful	P
5	5	Spores	E

Dryopteris pseudo-filix-mas	2002	3	21.5"
Dryopteris pycnopteroides	2000	3	14"
Dryopteris remota	2000	3	17.5"
Dryopteris tokyoensis	2011	2;3;3	23"
Dryopteris uniformis	2000	2;1;2;3	25.5"
Dryopteris x australis	2000	5;3;2;3;2	42"
Dryopteris x complexa 'Robust'	2015	3;3	
Gymnocarpium dryopteris	2003	mass;1	4"
Gymnocarpium dryopteris 'Plumosum'	2007	mass;3	6"
Gymnocarpium oyamense	2007	5;mass;3	6"
Matteuccia struthiopteris	2007	mass;5;4;4	36"
Osmunda regalis 'Cristata'	2011	3	
Osmunda regalis 'Decomposita'	2013	2;3;3	10"
Osmunda regalis 'Purpurascens'	2007	2;1;1	30"
Osmunda regalis var. regalis	2007	4;1;1	32"
Osmundastrum cinnamomeum	2003	mass;1	42"
Polypodium vulgare	2003	2;3;2;3	7"
Polystichum aculeatum	2001	3	24"
Polystichum braunii	2007	3;3	30"
Polystichum braunii	2007	3	19"
Polystichum microchlamys	2015	1;1	

5	5	2 plts with spores; 1 plt smaller	E
3	4	1 plt with spores; 2 appearances to fronds - curly and smooth	F
4	5	Spores; 1 plt smaller	G
3	5	1 smaller plt; 3rd plt a diff species	F
5	5	Spores	E
5	5	Spores	E
		Currently in Greenhouse; will plant in Spring 2016	A
3	3	No spores; hard winter; still spreading into loose mass	F
3	3	Thinly spreading	F
3	4	5 sm clumps; hard winter	F
5	5	Continuing to spread	E
		Located in different garden, I will have to get this info in 2016	A
3	5	Very dry	F
4	5	No spores	G
4	5	Spores	G
5	5	Mass of native plants	E
3	5	2 clumps	G
4	5	2 plants with spores, 1 plt struggling	G
5	5	Spores; 1 plt small & asymmetrical	E
5	5	Lots of spores	E
		Currently in GH	A



Athyrium hybrida
‘Ocean’s Fury’

Photo below courtesy
of Mark Dwyer, Rotary
Botanical Gardens

Rotary Botanical Garden

Photo above courtesy of Mark Dwyer



Athyrium hybrida **‘Ghost’**

Photo above courtesy of
Mark Dwyer, Rotary Botanical
Gardens

Athyrium niponicum
‘Pictum’

Photo right courtesy of Mark
Dwyer, Rotary Botanical Gardens





*Epimedium
youngianum
'Niveum'*

Photo left courtesy
of Bill Roeder

*Epimedium x
perralchicum
'Frohnleiten'*

Photo right courtesy
of Bill Roeder



Epimedium x rubrum

Photo left courtesy
of Bill Roeder



Epimedium wushanense

Photo right courtesy
of Bill Roeder

Polystichum neolobatum	2002	2;3;2;3	21"
Polystichum retroso-paleaceum	2007	1;1;1;1;1;1	15"
Polystichum setiferum 'Bevis'	2007	1;1;1;1;1;3;3	17"
Polystichum setiferum 'Bevis'	2008	1;2;3	17"
Polystichum setiferum 'Divisilobum'	2006	1;3	16"
Polystichum x dycei	2008	2;3	32"

These didn't survive, mainly due to winter kill

Adiantum aleuticum	Dryopteris championii
Adiantum aleuticum	Dryopteris clintoniana
Adiantum aleuticum 'Subpumilum'	Dryopteris crassirhizoma
Adiantum hispidulum	Dryopteris cristata
Adiantum pedatum	Dryopteris cycadina
Adiantum venustum	Dryopteris decipiens
Adiantum x mairisii	Dryopteris formosana
Arachniodes standishii	Dryopteris hondoensis
Asplenium adulterinum	Dryopteris indusiata
Asplenium ebenoides	Dryopteris koidzumiana
Asplenium trichomanes	Dryopteris scottii
Athyrium filix-femina 'Frizelliae'	Dryopteris tokyoensis
Athyrium otophorum	Matteuccia struthiopteris var. pennsylvanica
Athyrium vidalii	Polystichum munitum
Blechnum novae-zelandiae	Polystichum munitum
Cheilanthes tomentosa	Polystichum piceopaleaceum
Cyrtomium lonchitoides	Polystichum xiphophyllum
Dryopteris affinis 'Crispa'	Woodsia intermedia
Dryopteris affinis 'Stableri Crisped'	Woodwardia unigemmata

4	5	1 plt still struggling; hayscented increinged	G
5	5	Spores	E
3	5	Assymetrical	F
5	5	Beautiful;Very nice	E
5	5	Few spores	E
5	5	1 plt still smaller, moved out from under woody plants in 2013	E



Coastal Maine Botanical
Garden path

Photo courtesy of Sue Olsen

Why? Epimediums in the Fern Garden

Bill Roeder – Grower and Partner

Bouquet Banque Nursery, Marysville, WA



Before we attempt an answer to that question, a little historical information about epimediums is appropriate. After all, not everyone is already a convert to the idea that a garden ‘must’ have epimediums. But I am not going to bore you with a lot of details as I am a grower and a gardener and wish to share with you my great appreciation of this genus.

There is reference to epimediums as early as 1AD by the Greek herbalist Dioscorides and, later, Pliny the Elder. However, these thoughts were apparently copied from the lost herbal of Sextius Niger around 25BC. So Dioscorides description of some 600 plants was the leading authority on epimediums, listing also medicinal properties, until around 1500. Medicinally, several of the epimediums have been used for centuries, especially in China, in various treatments of barrenness and libido. As a humorous aside, at least once

every year, a young adult male will come to the plant sales and quietly ask me if I grow *E. sagittatum*, commonly known as Horny Goat Weed. I am always curious if he plans on eating it, smoking it, or what?! Anyway, epimediums have been around a long time.

Let us begin to explore the question more closely. First, most epimediums like humousy, moist soil in a semi-shaded or forest siting. There have been so many articles written on the 'dry shade epimedium'. Yes, there are about 8 Mediterranean varieties that are quite drought tolerant and will do well in a *nearly* full sun location. But the other 300+ species and cultivars are partial shade lovers and do need that moist, rich soil to do well. Your location will have a lot to do with how these plants react to the heat of summer and the cold and wet of winter. Here in Washington, we are fortunate to have what is considered a rather mild climate. Having said that, there are micro-ecosystems everywhere. Seattle, the northwest city of hills may experience summer high temps of 80 in areas that have the summer breezes from the bay and other areas of the city that experience the 90's. We usually have late summer, July – August, with as many as 70 days with no moisture. (Don't worry, we make up for it in the winter and spring.) So even drought tolerant epimedium varieties suffer during late summer. Much like the ferns, the partial shade forest siting is perfect. In winter, epimediums need good drainage so they do not have too much moisture around their roots. Again, Washington has a lot of rain during the winter, and also a time of intense cold in some areas of western Washington. The Seattle area averages a lowest temperature of about 22 degrees. The surrounding areas, as close as 15 miles east and north often experience 10 degrees lower winter temperatures. At our nursery in Marysville, about 40 miles north of Seattle, we often experience a week of 8 – 10 degrees in January. And with good drainage, epimediums survive these temperatures with varying degrees of damage, but they do survive. So I offer this information for those of you who do not live in our area but can make comparisons for your garden's climate. Epimedium varieties that are evergreen at temperatures of 20 -25 degrees may not be evergreen for us in the nursery or garden or for your garden. Also, summer high temperatures mean our epimediums show a lot more summer stress when not in the proper site. You notice, as a grower, I do not give zone information as much of Northwest Washington is considered zone 7 but reality is a range from 5 to 7b.

So epimediums are very similar to the many ferns in their requirements for the garden. I divide the epimedium into the drought tolerant varieties, semi-evergreen varieties, evergreen varieties and deciduous varieties. The most asked question I get from gardeners who are not familiar with epimediums is "What is your favorite?". Of course, my answer is to ask a number of questions. First, what kind of siting do you have - shade or sun, dry or wet? If the siting is in a lot of sun or, as we often have in the Northwest, a shaded bank under fir trees, then I point to the **Mediterranean** varieties. *Epimedium x perralchicum* 'Frohnleiten' is my favorite in this group. (See photo page 37) A clumper that performs extremely well in dry shade, the spring foliage is reddish-brown with green veining. Bright, small yellow flowers are held slightly above the foliage in early spring. Foliage turns green as summer begins and it stays evergreen with very little damage in this area. Can be haircut by the first of February to show the new foliage or, my preference is to prune out the damaged foliage. Extreme cold can cause some foliage to turn dark red. Another good selection for dry shade, but without the extreme drainage of the hillside, is

either *E. x rubrum* or *E. x versicolor* 'Sulphureum'. I consider these two **semi- drought tolerant**. *E. rubrum* has red flowers in mid spring with new foliage having reddish tints containing veining. (See photo page 37) It is a shorter, 12", clumper. It goes dormant in winter with the foliage remaining a gold mound. Haircut by the first of February. *E. x versicolor* 'Sulphureum' is at least 150 years old and a proven winner in our garden as well as pot culture. It forms a large clump that will continue to expand year after year. The leaves reach 18" tall, are heart-shaped and turn red and brown in the cold of winter. The flowers are yellow, as are most of the drought tolerant epimediums. Best if you haircut this one by the first of February.

Now we get into the other 300 varieties that like the partial shade and average garden moisture. **Evergreen** – I personally love the Chinese varieties that have the large, toothed or spiny leaves. There is such a variety that it is hard to choose a favorite, so I will mention some outstanding evergreens. *E. wushanense* is always near the top of the list with its large, up to 10" long x 4" wide, dark green leaves, sometimes with a slight pinkish-brown coloration near the tip. (See photo page 37) Clumps can be 30" tall or more. It is a prolific bloomer with up to 100 blooms of yellow and white on each raceme. It likes moisture and fertilizer. The largest *E. wushanense* I have seen is grown by a friend in pure clay on the north side of the house where it gets a fair amount of light but no sun! Another favorite in very early spring is *E. pubescens*. This is a tall Chinese species that is the earliest to bloom in most gardens, by the first of March in our Marysville garden. The leaves are lung-shaped, green with blotching, and the tiny white and yellow flowers are held high above the foliage, as much as 24" tall. As with most of the Chinese epimediums, it is grown from small rhizomes. Another great clumping specimen is *E. epstenii*, with its white flowers and red centers. Striking! Again, spiny evergreen leaves but a height of only 6 – 8 inches. Here I must mention a very unique variety that has a very specific purpose. *E. pauciflorum*, a groundcover that runs by slender rhizomes, and I do mean runs! If you have the dry hillside under trees or a larger area that you do not want to put too much effort into care, this one is a real performer. Stays between 4 and 6 inches tall with round, notched leaves that are considered evergreen in much of our milder Seattle areas but can show some damage during bad winters. Either take the lawn mower to it in late January or just leave it and the new foliage overtakes the old. Early spring brings a carpet of small, white flowers. And last, but not least, I must bring up *E. x rubrum* 'Sweetheart'. Evergreen in milder areas that stay near the 25 degree low temp, this one has large, heart-shaped leaves that are tinted with red in spring and turn green later in the summer. The flowers are reddish-pink and held high above the foliage. Our plant reaches 20" inches tall with 2 ½" wide leaves in the garden. I haircut this one when too much damage shows, first of February, before new growth gets in the way of trimming. The **deciduous** varieties are almost boundless. Darrell Probst, of MA, is the guru of epimediums and continues to hybridize many of the Japanese epimediums, as well as others. Many other hybridizers, especially in Europe, are also creating many new cultivars. These are mostly the *E. x youngianum* and *E. grandiflorum* epimediums. As well as Darryl Probst, esteemed Japanese plantsman, Mikinori Oguisu has been very instrumental in developing the Japanese grandiflorum. My all-time favorite in this deciduous group is *E. grandiflorum* 'Dark Beauty'. After being haircut by February first, the new foliage emerges dark purple, almost black, in color and goes through various

shading changes to eventually turn green for the remainder of the summer. While these changes are taking place, the most beautiful blooms of purple and white occur. This plant reaches a height of approximately 12 inches and the foliage sways in the breeze until late fall and the first frosts. *E. grandiflorum* 'Lavender Lady' is a cross between *E. sempervirens* 'Violet Queen' and *E. grandiflorum* 'Silver Queen', with the early red leaf edging coming from the 'Violet Queen'. It forms a large groundcover mass just 8" tall. The flowers are large and lavender colored with white spur tips and the foliage turns soft green after blooming. A striking addition to the spring fern garden *Epimedium grandiflorum* 'Nanum' at only 5" tall at bloom, with a second flush of white flowers reaching 10" is a perfect epimedium for the border edge, sharing the space with your special petite ferns. The spring leaflets have a purple band edging. And last, as I could go on forever, a real favorite with white flowers is *E. x youngianum* 'Niveum'. (See photo page 37) Another small mounder at 8 – 12 inches, this epimedium has dense foliage with the flowers having no spurs, a prolific bloomer in mid-spring. Deciduous so give it a cutting by February 1.

Epimedium foliage both compliments and contrasts with fern foliage. Spring 'fairy wing' flowers add color to the emerging garden and summer foliage and can be dominating or very ephemeral – there is such a range within this genus. Epimedium are deer resistant and slugs usually prefer other foliage. The only real pest is vine weevil in the roots of the drier sites. Unfortunately, the only control is chemical for these, but mature epimediums seem to be able to hold their own when infested. No fungal diseases are a real problem, so they are a very attractive, easy care addition to your fern garden.

Rotary Botanical Gardens Janesville, WI

Hardy Fern Foundation Affiliate Test Garden

Mark Dwyer – Director of Horticulture

Rotary Botanical Garden (RBG) has been an Affiliate Test Garden for the Hardy Fern Foundation since 2005. Located in Janesville, WI, RBG is a 20 acre, non-profit botanic garden on the site of an old sand and gravel pit. (See photos page 36) Hitting natural springs with the mining operations over 100 years ago, the pits filled with water and these ponds (continually spring fed) rarely will freeze. Founded in 1989, the gardens now feature 24 distinct garden themes that are situated throughout the site (owned by the City of Janesville). Our fern & moss garden was built in 2003 and a fern collection of over 250 taxa was amassed for trialing and display. This 4,000 square foot space is developed around a waterfall, streams and a small "island" that features native Wisconsin mosses. Our fern "acquisition plan" continues to include obtaining every available fern listed to a zone 6 hardiness. Ferns that perish are planted up to two more times to adequately test what might be primarily a hardiness and/or placement issue. When possible, ferns are ordered in quantities of three and planted together. The ferns are roughly arranged by

region of origin with large beds featuring ferns from North America, Europe and Asia respectively. Every fern has a primary label, buried label and are tracked via frequently updated maps. This garden space also features other complimentary perennials, early spring bulbs and an overhead canopy of mature cottonwoods (*Populus deltoides*) provides dappled shade to the entire site. An automated irrigation system has been installed and is utilized as needed to address both moisture and humidity needs.

The weather is extremely variable in our location with the typical expectation of harsh winters and very hot summers. We are considered a zone 5a garden with winter temperatures rarely dipping below -20 degrees F. However, the winter of 2013 was extremely severe with many successive nights of close to -35 degrees F with minimal snow cover. We lost many of our more “marginal” ferns over this winter season. Summer high temperatures average in the lower 80 degrees F although occasional warm stretches in the 90 degrees F and above do occur. Janesville, WI receives an average of 33” of rainfall annually. However, precipitation fluctuates dramatically and supplemental irrigation has been vital over the course of many summers. In the early spring of 2008, heavy rains and extensive snowmelt contributed to the local Rock River flooding downtown Janesville. With our ponds linked to the Rock River, our pond level was almost 6’ over average height and flooded over 2/3 of the fern & moss garden for two months. We lost most of our ferns in the flood zone and ultimately have been replacing and re-evaluating the entire collection over the past seven years.

Our trialing format for this space includes very frequent observations, notes and thousands of photos. During the busy season, we find ourselves stretched thin with significant garden maintenance and the management of other trial gardens. When time is tight for more formal evaluations, I will frequently photograph fern specimens throughout the growing season for later observations on vigor. While we have not assigned any sort of formal values to our evaluation system, we do categorize selections in to three primary categories of Excellent/Good, Average and Poor/Dead. The majority of our ferns consistently do fairly well although the harsh winters start “thinning the herd” with our marginal selections. Hot summers have also affected vigor although the irrigation system has been invaluable despite the fact that it utilizes City of Janesville water which has additional minerals and treatment. Root competition from the overhead trees is certainly a factor which we account for with frequent observations of soil wetness. Amendments have been provided as needed and while drainage is not a problem, continued augmentation of the soils occurs on a regular basis.

I’ve included two tables that feature 40 ferns collectively. With the challenge of the 2008 flooding damage coupled with the severe winter of 2013 (many losses), we feel very confident in sharing our 20 most successful ferns (unsurprisingly many natives) and our 20 ferns that have not only done poorly but have now died after their third replanting. A side project with this collection is to continue to closely compare every Japanese painted fern and painted fern hybrid that we can find. They all do well for us although we’re interested in their ornamental differences which aren’t always evident. We don’t blame just hardiness with our losses as we continue to research possible reasons for fern failure as it relates to our soils (structure, pH, moisture, summer heat, sunlight, etc.). We

continue to enjoy our affiliation with the Hardy Fern Foundation and will continue to maximize our fern & moss garden for trialing and certainly to promote the value of ferns in the home gardens of our 100,000+ annual visitors.

Rotary Botanical Gardens ~ Fern Collection Successes	
<i>Adiantum aleuticum</i>	Western maidenhair fern
<i>Adiantum pedatum</i>	maidenhair fern
<i>Athyrium filix-femina</i> ‘Lady in Red’	lady fern
<i>Athyrium filix-femina</i> ‘Victoriae’	crested lady fern
<i>Athyrium hybrida</i> ‘Ghost’	hybrid painted fern
<i>Athyrium hybrida</i> ‘Ocean’s Fury’	crested hybrid painted fern
<i>Athyrium niponicum</i> ‘Applewood’	crested Japanese painted fern
<i>Athyrium niponicum</i> ‘Silver Falls’	Japanese painted fern
<i>Dryopteris celsa</i>	log fern
<i>Dryopteris complexa</i>	robust male fern
<i>Dryopteris crassirhizoma</i>	thick-stemmed wood fern
<i>Dryopteris filix-mas</i> ‘Linearis Polydactyla’	fishbone fern
<i>Dryopteris marginalis</i>	marginal shield fern
<i>Onoclea sensibilis</i>	sensitive fern
<i>Osmunda claytoniana</i>	interrupted fern
<i>Osmunda regalis</i> ‘Purpurascens’	royal fern
<i>Osmundastrum cinnamomeum</i>	cinnamon fern
<i>Polystichum acrostichoides</i>	Christmas fern
<i>Polystichum braunii</i>	Braun’s holly fern
<i>Polystichum polyblepharum</i>	tassel fern

Rotary Botanical Gardens ~ Fern Collection Failures	
<i>Arachniodes standishii</i>	upside down fern
<i>Asplenium platyneuron</i>	ebony spleenwort
<i>Asplenium trichomanes</i>	maidenhair spleenwort
<i>Athyrium otophorum</i>	eared lady fern
<i>Blechnum spicant</i>	deer fern
<i>Cheilanthes lanosa</i>	hairy lip fern
<i>Cyrtomium fortunei</i>	holly fern
<i>Cyrtomium macrophyllum</i>	big leaf holly fern
<i>Dryopteris carthusiana</i>	spinulose wood fern
<i>Dryopteris formosana</i>	Formosa wood fern
<i>Dryopteris labordei</i> ‘Golden Mist’	Asian wood fern
<i>Dryopteris sieboldii</i>	Siebold’s wood fern
<i>Dryopteris tokyoensis</i>	Tokyo wood fern

<i>Polystichum aculeatum</i>	hard shield fern
<i>Polystichum makinoi</i>	Makinoi's holly fern
<i>Polystichum setiferum</i>	soft shield fern
<i>Thelypteris decursive-pinnata</i>	Japanese beech fern
<i>Thelypteris kunthii</i>	Kunth's maiden fern
<i>Woodsia pseudopolystichoides</i>	woodsia
<i>Woodsia subcordata</i>	subcordate woodsia

What A Winter It Was!

Joan Eiger Gottlieb ~ Pittsburgh, PA

With apologies to Charles Dickens, it was the best of winters; it was the worst of winters. It all depends on where you experienced the weird winter of 1915-'16.

Here in western Pennsylvania it was a relatively mild one, with several short episodes of intense cold (temps. in the single digits or low teens) and many longer intervals of normal or above normal temperatures (30s, 40s, 50s, plus occasional teasers in the 60s). As this is being written, the roller coaster continues, and we basked in unseasonable 60s and 70s most of the first half of March. The adage "March comes in like a lion and goes out like a lamb" has been quite upended. There was one 4 - 5" snowfall in early February and a few one inchers for which it was not even worth taking up a shovel. The biggest problem for local gardeners this winter (aside from the ever-hungry deer) has been the repeated freeze-thaw cycling that heaves our plants (especially shallow-rooted ferns) out of any inadequately mulched ground, killing many tender crowns.

Lack of a consistent, insulating snow blanket made winter mulching more important than ever. Garden-grown plants tend to be soft and pampered, making them more prone to winter damage than those of the same species forced to survive on their own in the "wild." Rhizomatous, hardy natives (e.g. *Adiantum*, *Cystopteris*, *Phegopteris*, *Woodwardia*, *Onoclea*) that disappear into underground dormancy should be fine. Upright shoot and crown formers, on the other hand, depend on having natural leaf cover or mulch around their root zones, but their exposed, upright buds, chock-full of tightly coiled crosiers, often succumb to prolonged, killer frosts. Perversely, the crowns can rot under thickly applied, heavy mulches. It is wise to use no more than an inch or two of loose, fluffy leaf compost around crown areas. Following this somewhat tedious recipe in late fall, even many delicate Victorian cultivars of European shield fern (*Polystichum setiferum*) continue to thrive in Zone 5 Pittsburgh gardens. Two native species of *Dryopteris* (*D. intermedia* and *D. marginalis*) are our most abundant woodland survivors, remaining winter green and carpeting the ground throughout the otherwise deciduous, drab, brown/gray winter months.

Male fern (*D. filix-mas*), with its distinctive, paired rows of medial sori, is widely tolerant of soil types and extreme temperatures. It is a semi-wintergreen stalwart of the fern garden

with tall, elegant fronds emerging in mid-spring in shuttlecock form from tight crowns. Most of our garden male ferns are from British nursery stock (reported to be fertile, allopolyploid hybrids of *D. caucasica* and *D. oreades*). A tetraploid, American male fern occurs on dolomitic (magnesium-containing) limestone in cool, hardwood forests of Michigan and Ontario, with one site reported by the writer for the Pittsburgh, PA area. There are populations of male fern in the Pacific Northwest and southern Rockies, but the whole complex is poorly understood and its origins obscure. Its genomic diversity may, however, illustrate the type of defense our fern flora needs against periodic weather severity and slow climate change.

Two native spleenwort species (*Asplenium platyneuron* and *A. trichomanes*) are also winter tough, but they must have shade, excellent drainage, and a bit of protection from slugs in the garden. In our forests they are mostly seen on slug-free, fairly steep, limestone or shale slopes, from which their long, capillary-like roots can “sip” water trapped in minute rock cracks or pores. Rare walking fern (*A. rhizophyllum*) and even scantier hart’s tongue fern (*A. scolopendrium*), both calciphiles, are reliable winter survivors in a slug-free, well-drained, limestone cobble. Despite their tenacity on bare rock in nature, these un-fern-like gems are extremely difficult to establish in the garden. Some varieties of British hart’s tongue do not thrive here and appear to be more sensitive to dry winters, like the one now ending here. The British subspecies is diploid; the American material is tetraploid; that may be an additional survival factor in our harsher and drier seasons. Challenging all expectations, the endangered, native climbing fern (*Lygodium palmatum*), well established in its peaty garden bed, always looks perky and green after the last snow retreats - as if winter never existed. Last year’s perfectly preserved fronds will not begin to wither until the first new fiddleheads appear in May.

The lady fern genus (*Athyrium*) contains lots of reliably hardy, native and imported species, along with some favorite and colorful cultivars. The native, American lady fern (*Athyrium filix-femina*) exists as three regional subspecies in the east, south, and west, all sporting finely dissected leaf architecture, poster-perfect as stereotypical “feathery” ferns. They are, however, exceptionally vigorous, producing tough, nearly impenetrable rhizome/root mats. British plant breeders have spun off dozens of Victorian-style cultivars including ‘Frizelliae’ (tattooing fern) with pinnae reduced to nubbins and ‘Victoriae’ with crisscrossed pinnae. The Asian lady ferns (e.g. *A. niponicum* ‘Pictum’ and *A. otophorum*) offer a rainbow of cultivars with foliage ranging from brilliant silver to dark burgundy. They not only satisfy the fern gardener’s desire for color interest, but demonstrate the broad, adaptive potential of their many genotypes.

Just 350 miles east of Pittsburgh and the Allegheny Mountains, the Philadelphia area and the Atlantic coastal plain had quite a different 2015-2016 winter. Repeated storms and “nor’easters” dropped as much as four feet of snow at a time in major cities like Boston, New York, and Washington, D.C. Former temperature and snow records were equaled or surpassed. Near hurricane winds increased the misery index, and blowing snow prevented safe road maintenance. Even the Carolina and Georgia coasts were not spared, and the states were woefully unprepared for the many downed trees, power outages, and impassable highways. Floods and out-of-season tornados afflicted the Mississippi

and Ohio valleys, bringing mayhem to large swaths of mid-western and plains states. North-south migration of the circum-global Jet Air Stream brought “Polar Vortex” blasts (more impressive and scarier version of “arctic air mass”) down from Canada more than once, paralyzing the nation’s heartland. Assuming flood waters recede within 72 hours, native or hardy coastal plain and swamp ferns, including the rarer ones like *Woodwardia areolata* (netted chain fern), *Thelypteris simulata* (Massachusetts fern), and *Dryopteris cristata* (crested wood fern) should be fine, along with more common *Matteuccia struthiopteris* (ostrich fern), and *Onoclea sensibilis* (sensitive fern). The extra water may turn out to be a boon to the “hybrid *Dryopteris* swamps” so beloved by field botanists. Punishing storms and floods have existed worldwide throughout geological history. Wetland plant species have adapted to such conditions in a variety of ways, including hummock formation and prop-style root mats formed by *Osmunda* species. These act like sponges and bring needed oxygen to emergent crowns.

Out west strong El Niño storm systems walloped the Pacific coast, especially in southern California, over the winter months. Torrential rain and powerful ocean waves saturated soils, generated epic mud slides, swept away roads, and wreaked extensive coastal destruction. One news photo at the beginning of March showed a long row of condemned, multi-story apartment buildings sliding into the ocean at Pacifica in the Los Angeles area. The coastal high ground was completely hollowed out under the buildings by the pounding ocean. Now in early 2016 March record flash floods are inundating the coasts of Mississippi and Louisiana, described in the media as “catastrophic flood emergencies - the worst in over 50 years.” There will undoubtedly be many plant losses if the severe flooding is prolonged.

One of the few pieces of good weather news is that accumulated rainfall, along with over four feet of snow in the high Sierras, might be enough to break the back of California’s decade-long drought. For plant lovers, the Sonoran and other desert areas are expecting one of their best spring blooms. The drab sand will be literally covered with colorful flowers that open for pollination and shed drought-resistant seeds in the space of just a few weeks. Desert (xeric) ferns are naturally adapted to dry land conditions. Some live resurrection lifestyles - crisply coiled through tough times to conserve water. Many species of “*Cheilanthes*” (lip ferns), *Notholaena* and *Astrolepis* (cloak ferns), *Aspidotis* (lace ferns), *Pellaea* (cliff brakes), and other genera, have stiff, water-storing textures and/or sun-shielding waxes, farinas, hairs and scales. Most have exceptionally long root runs and grow in the shade and protection of rock crevices or cacti. Many desert ferns reproduce apogamously (without water-requiring gametes), allowing asexual (clonal) propagation of the species in dry habitats, but forgoing the gene mixing of egg and sperm so vital for evolutionary selection and long-term adaptation to change. Many previous, long droughts in places like California have tested and honed these plant survival strategies through such natural selection.

What does this all mean or augur? Is the severity of the 2015-‘16 winter in so many places just part of a natural ebb and flow of weather patterns in strong El Niño (Pacific Ocean warming) years? Or is it one of many harbingers of a climate shift that scientists warn will inexorably worsen? According to the National Climate Assessment prepared by a

large scientific panel and released in May, 2014, it is probably both. There is evidence that climate change, when it has occurred in the geological past, was also marked by weather extremes, including record warmth and cold, drought and deluge. Despite the epic frosts and snowfalls in New England and New York of the winter, 2015 was one of the warmest years (overall average) of the century.

Yes, it was quite a winter, but, as it passes into the statistics of history, what we learn and make of its lessons and many others will be lasting, and hopefully planet sustaining.

Fern Festival 2016

Friday, June 3rd, 12-6:30

Saturday, June 4th, 9-2

**The best fern sale in the country!
A huge variety of ferns and rare plants!**

**Friday night Annual Meeting - 6:30
Friday night lecture by Ed Alverson - 7:00**

Ed Alverson has a BS in Biology from The Evergreen State College and a MS in Botany from Oregon State University, where he studied the systematics of the fern genus *Cryptogramma*. Ed has worked as a field botanist and stewardship ecologist in the Pacific Northwest (particularly in Oregon's Willamette Valley) for over 35 years. He has varied botanical interests, from fern taxonomy, ecology, and biogeography, to the conservation, management, and restoration of prairie, savanna, and oak woodland habitats. Ed has authored more than 50 popular and scientific articles on a variety of botanical and ecological topics, from plant taxonomy and ecology to botanical history and exploration, and has authored revised treatments for many fern families for the forthcoming second edition of Flora of the Pacific Northwest.

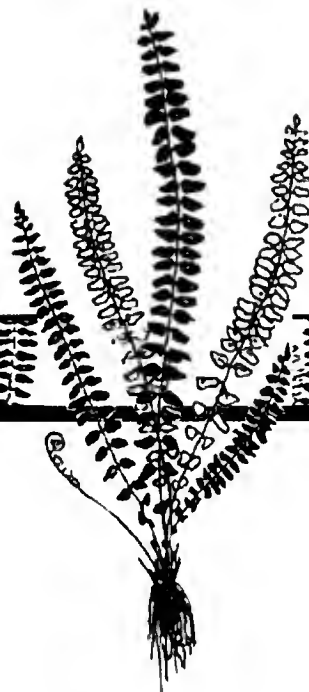
Editor's Note –

Several months ago there was a very interesting presentation concerning the bracken fern on CNBC. They described a proposal to use it for biofuels!! Needless to say it was quite engrossing and I requested permission to reprint it in our HFF Quarterly. They declined but did give me this link to the information:

<http://www.cnbc.com/2015/12/15/fern-baby-fern-why-bracken-is-the-future-of-biofuel.html>.

Enjoy and just think of the possibilities!

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